REMARKS

Claims 83-89, 91-98, 100, and 102-103 are pending. Claims 1-82, 90, 99, 101, and 104 have been canceled without prejudice.

The specification was objected to because of a typographical error on page 10, line 18. Various claims were objected to because of lack of antecedent basis for certain claim terms, as identified in the Office Action.

Claims 83-85 were rejected under 35 U.S.C. 102(b) as being anticipated by JP 2002126919 A ("JP '619"). Claims 86-88 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP '619 in view of U.S. Patent No. 4,791,841 to Pruvot et al. Claims 89-91, 93-99, and 102-104 were rejected as unpatentable over JP '619 and Pruvot and further in view of U.S. Patent No. 4,943,071 to Srebot et al. Claim 92 was rejected as unpatentable over JP '619. Claim 100 was rejected as unpatentable over JP '619 in view of Pruvot and further in view of Srebot.

Response to Objections

Applicant has amended the specification as suggested by the Examiner, and has amended the claims to address the antecedent basis issues identified by the Examiner. It is respectfully submitted that the specification and claims are now in proper form.

Response to Rejections

Claims 83-89 and 91-92

Claims 83-85 were rejected under 35 U.S.C. 102(b) as being anticipated by JP '619. Claims 86-88 were rejected under 35 U.S.C. 103(a) as obvious over JP '619 in view of Pruvot. Claims 89-91 were rejected as obvious over JP '619 in view of Pruvot and further in view of Srebot. Claim 92 was rejected as obvious over JP '619. All of these claims share the limitations of Claim 83, and thus only Claim 83 will be specifically discussed here.

Claim 83 recites that "the outer surface of the collet and the inner surface of the shaft bore are tapered with respective taper angles, the collet and the shaft bore tapering radially inwardly away from a tool receiving mouth of the collet such that *when the rotary tool holder is stationary, the taper angle of the collet is greater than the taper angle of the shaft bore* and at least one of the shaft and the collet is arranged such that *when the rotary tool holder assembly is rotated at a high speed there is relative deformation between the outer surface of the collet and the inner surface of the shaft bore to give a substantial fit therebetween*". This characteristic of the claimed rotary tool holder assembly will be referred to herein as "taper-matching", i.e., the change from mismatched taper angles in a stationary condition, to a substantial fit between the collet and shaft bore at a high rotational speed.

Claim 83 further requires that "a friction reducing coating is provided between at least a portion of the inner surface of the shaft bore and the outer surface of the collet."

With regard to the taper-matching aspect of the claimed rotary tool holder assembly, the Office Action asserted that a comparison between Figure 1 and Figures 6A and 6B of JP '619 shows that when the tool holder is stationary a taper angle of the collet is greater than a taper angle of the shaft, and that when the tool holder is rotated at high speed there is a relative deformation between an outer surface of the collet and an inner surface of the shaft bore to give a substantial fit therebetween. With regard to the friction-reducing coating of Claim 83, the Office Action asserted that element 38 in JP '619 meets the claimed friction-reducing coating.

Applicant respectfully submits that the rejections are erroneous. In JP '619, three jaws of the collet 31 form a grasping part 34 that can expand in diameter when the collet is moved axially out from the shaft bore (Figures 6A and 6B), in order to release a tool. Figure 1 shows the tool holder when the collet is retracted back into the shaft bore. It thus appears that any taper mismatch that occurs in the tool holder is a result of the expansion of the grasping part 34.

As described in the present specification, an advantage of the rotary tool holder of Claim 83 is that the collet and shaft have complementing shapes at high rotation speeds as a result of their taper mismatch when stationary. In other words, the collet and shaft are intentionally designed to have mismatched taper angles when stationary such that a substantial fit between

them will result at high rotational speed because of the deformations caused by the high rotational speed. Additionally, the claimed rotary tool holder has a friction-reducing coating between the shaft and collet, such that the collet can slide on surfaces of the shaft while their respective shapes change.

Neither the taper-matching aspect nor the friction-reducing coating of Claim 83 is disclosed or suggested by JP '619. The focus in JP '619 appears to be the prevention of sticking of the collet to the inner periphery of the chuck when it is desired to release a tool. This sticking is initially prevented because when the grasping part 34 is expanded in diameter the collet has a greater taper angle than the shaft bore (Figures 6A and 6B), such that only a small surface area of the collet contacts the shaft bore. This taper mismatch is worn down over time as tools are loaded and unloaded, such that a larger area of the collet is in contact with the chuck, leading to an increased chance of sticking. JP '619 addresses this problem by providing a lubricant such as grease stored in grooves 38 in the outer surface of the collet. Figures 2 and 3 show some of the different forms the grooves 38 can take.

Applicant's specification discusses the disadvantages of using grease (see page 1, lines 19-25, and page 2, lines 6-15), and specifically distinguishes the friction-reducing coating used in Applicant's invention from grease such as taught by JP '619. It is clear from the specification that the friction-reducing coating is essentially permanently coated onto certain parts, as opposed to grease, which is prone to being displaced by centrifugal forces when the rotary tool holder is rotated at high speed. Thus, it is improper to construe JP '619's grease as being the same as the claimed friction-reducing coating. JP '619 neither teaches nor makes it obvious to provide a friction-reducing coating between the collet and shaft as claimed in Claim 83.

Additionally, there is no suggestion in JP '619 that there is any relative deformation between the shaft and the collet at high rotation speeds such that there is a substantial fit therebetween. JP '619 merely shows a taper mismatch when tools are unloaded and loaded so that the likelihood of sticking of the collet is reduced. Thus, JP '619 is directed to a completely different problem from the invention of Claim 83, and as such, it would not have provided any

hint or suggestion to intentionally design the collet and shaft with taper mismatch at stationary conditions so that under high-speed rotation there is a substantial fit between the parts.

For these reasons, Applicant respectfully submits that JP '619 does not anticipate the invention of Claim 83, or render it obvious. Pruvot and Srebot also fail to teach or suggest the taper-matching and friction-reducing coating of Claim 83. Therefore, Claims 83-89 and 91-92 are patentable over the cited references.

Claims 93-98, 100, and 102

Claims 93-99, 100, and 102 were rejected as obvious over JP '619 in view of Pruvot and further in view of Srebot. Claim 93 has been amended to include the subject matter of original Claim 99, and recites a rotary tool holder assembly having a spring disposed in a spring receiving bore for biasing the collet towards the gripping position, a friction reducing coating being provided between at least a portion of the spring and the spring receiving bore, wherein at least a portion of the spring is coated with a friction reducing coating. Claim 102 is similarly directed to a rotary tool holder assembly wherein at least a portion of the spring is coated with a friction reducing coating.

As noted, JP '619 teaches that grease should be contained in grooves in the collet in order to reduce possible sticking between the collet and the shaft.

As the Office Action acknowledged, JP '619 and Pruvot fail to disclose a friction reducing coating between a spring and spring-receiving bore, as well as a friction reducing coating on a portion of the spring.

Srebot is cited as allegedly teaching the claimed friction reducing coating (specifically, element 53 is said to be the friction-reducing coating). Applicant respectfully submits this is erroneous. As previously explained, the present specification explicitly distinguishes the friction-reducing coating from a lubricant such as grease. Srebot teaches only that grease can be fed into the chamber 21 that houses the springs 52, via a greaser 53 (see col. 4, lines 14-16). For

the reasons previously given, it is improper to construe Srebot's grease as the claimed friction-reducing coating.

As discussed in Applicant's specification, there is a desire to reduce or eliminate the need for grease between mating surfaces in a shaft assembly. By providing a friction-reducing coating on the spring, frictional build-up between the spring and the spring-receiving bore is reduced and a high gripping force on a clamped tool is maintained even after many years of use or during intense operating conditions. Furthermore, by applying the friction-reducing coating on the spring, frictional losses within the spring itself (for example, between adjacent surfaces) can be reduced.

There is no disclosure in Srebot or the other prior art of record, that it would be possible or desirable to provide a friction-reducing coating on a spring that biases a collet in a rotary tool holder assembly.

Applicant submits that the cited prior art does not recognize the problem associated with using grease in a rotary tool holder assembly, and certainly does not suggest the solution provided by the invention of Claim 93. Therefore, Claims 93-98, 100, and 102 are submitted to be patentable over the cited references.

Claim 103

Claim 103 was rejected as obvious over JP '619 in view of Pruvot and further in view of Srebot. Claim 103 is similar to Claim 93, in that it is directed to a rotary tool holder assembly in which a friction-reducing coating is provided on at least a portion of the spring.

As already explained, the cited references do not teach or suggest such a rotary tool holder assembly. Therefore, for substantially the same reasons given above for Claim 93, Applicant submits that Claim 103 is patentable over the cited references.

Conclusion

Based on the above amendments and remarks, it is submitted that all claims are patentable and the application is in condition for allowance.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefor (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

Donald M. Hill, Jr.
Registration No. 40,646

Customer No. 00826
ALSTON & BIRD LLP
Bank of America Plaza
101 South Tryon Street, Suite 4000
Charlotte, NC 28280-4000
Tel Charlotte Office (704) 444-1000
Fax Charlotte Office (704) 444-1111

ELECTRONICALLY FILED USING THE EFS-WEB ELECTRONIC FILING SYSTEM OF THE UNITED STATES PATENT & TRADEMARK OFFICE ON MAY 30, 2008.
LEGAL02/30824494v1